

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 16 October 2000 (16.10.00)	
International application No. PCT/GB00/00696	Applicant's or agent's file reference Q. CAO 14-2-2
International filing date (day/month/year) 28 February 2000 (28.02.00)	Priority date (day/month/year) 10 March 1999 (10.03.99)
Applicant CAO, Qiang et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

28 August 2000 (28.08.00)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Mougamadou ABIDINE
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

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ART 34 AMBT

PATENT COOPERATION TREATY

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REC'D 31 MAY 2001

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference Q. CAO 14-2-2	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/00696	International filing date (day/month/year) 28/02/2000	Priority date (day/month/year) 10/03/1999
International Patent Classification (IPC) or national classification and IPC H04J11/00		
Applicant LUCENT TECHNOLOGIES INC. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 6 sheets, including this cover sheet.

- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 28/08/2000	Date of completion of this report 29.05.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Agreda Labrador, A Telephone No. +49 89 2399 8263 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/00696

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1,4-16	as originally filed			
2,2a,3	as received on	26/04/2001	with letter of	23/04/2001

Claims, No.:

1-6	as received on	26/04/2001	with letter of	23/04/2001
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Drawings, sheets:

1/10-10/10	as originally filed
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2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/00696

- ☐ the description, pages:
☒ the claims, Nos.: 7
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-6
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-6
Industrial applicability (IA)	Yes:	Claims	1-6
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/00696

Reference is made to the following documents, cited in the International Search Report:

- D1: WO 95 03652 A (QUALCOMM INC) 2 February 1995
- D2: EP 0 814 581 A (NIPPON TELEGRAPH & TELEPHONE) 29 December 1997
- D3: I C-L ET AL: 'MULTI-CODE CDMA WIRELESS PERSONAL COMMUNICATIONS NETWORKS' COMMUNICATIONS - GATEWAY TO GLOBALIZATION. PROCEEDINGS OF THE CONFERENCE ON COMMUNICATIONS, SEATTLE, JUNE 18-22, 1995, vol. 2, 18 June 1995, pages 1060-1064, XP000533158 IEEE ISBN: 0-7803-2487-0

Re Item V: Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Independent claim 1 does not meet the requirements of Articles 33(1) and (3) PCT because its subject-matter is not based on an inventive step.

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1 and this document shows the following features thereof (applying the terminology of present claim 1 and references in parenthesis relating to D1):

A method of allocating a channelisation code (page 13, lines 16-17) in a code division multiple access system (page 1, lines 17-29) comprising for each user: selecting a node of the path in a code tree in dependence on the currently required spreading factor (page 16, lines 6-7 and 13-14); and reserving all nodes on the code tree in an upward and downward direction from the selected node (page 14, lines 11-31; page 15, line 37-page 16, line 18); wherein the selected node for any user must not coincide with a node reserved by any other user (page 15, line 37-page 16, line 18); and wherein the path in the code tree is defined based on a required range of spreading factors (page 17, lines 12-14).

This is the exact wording of claim 1, the subject-matter of which consequently differs from the disclosure of D1 in that for each user the defined path is

communicated to that user in the downlink during radio access bearer (RAB) establishment. This distinguishing feature provides the alleged advantage (see description on page 16, lines 26-29) of not repeating the RAB establishment each time there is a need to change the spreading factor. However, this distinguishing feature is rendered obvious by the disclosure of D1, which explains (page 26, line 32-page 27, line 2) that efficiency could be enhanced by changing the length of the assigned Walsh sequence **while a call is in progress** (and therefore, without RAB establishment).

The claim does therefore not meet the requirements of Articles 33(1) and (3) PCT.

2. The additional features of the dependent claims 2, 3, 5 and 6 are also disclosed in D1 (see specially sections II and III) and, consequently, cannot form the basis of another independent claim which meet the requirements of Article 33(1) and (3) PCT with respect to inventive step.
3. The additional features of dependent claim 4 do not add anything of inventive significance (Articles 33(1) and (3) PCT) to independent claim 1, being a trivial design possibility obvious to a skilled man based on his common general knowledge.
4. For the sake of completeness, it has to be said that the subject-matter of claims 1-6 is rendered not inventive (Articles 33(1) and (3) PCT) by the disclosures of D2 and D3 (see specially references cited in the search report), which also refer to the allocation of channelisation codes in CDMA systems.

Re Item VII: Certain defects in the international application

1. Although claim 1 is drafted in the two-part form the feature of lines 7-8 ("the path in the code tree is defined based on a required range of spreading factors") is incorrectly placed in the characterising portion, as it is disclosed in document D1 (see Item V.1 of the present report) in combination with the features placed in the preamble (Rule 6.3(b) PCT).

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/00696

2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
3. The prior art cited by the Applicant on pages 4-9 and 14-15 of the description, should have been clearly identified (Rule 5.1(a)(ii) PCT).
4. The description on page 11, lines 18-24 does not correspond with figure 5(a).

Re Item VIII: Certain observations on the international application

1. The independent claim 1 does not comply with the requirements of Article 6 PCT (see also Guidelines III-4.4) because the independent claims should clearly specify all the **essential** features of the invention.

The description refers to a specific scheme for allocating channelisation codes. However, the wording of the claim is so **broad** that it can be read onto the prior art cited on pages 4-9 and 14-15 of the description. The distinguishing features (based on the fact that **channelisation codes are re-used**), which allegedly provide some advantages over the prior art, are not included in the claim. The description conveys the impression that the method can only be carried out in that particular way, because no other alternatives are envisaged. Claim 1 however does not refer to the formulas and details needed to perform this method. This generalization is thus **not supported by the description** (Article 6 PCT).

The Applicant has argued that reusing channelisation codes is a feature of preferred embodiments. However, the whole of the description (see page 9, lines 20-25; page 13, lines 2-4) gives the impression that the new code allocation technique improves the prior art technique by enabling channelisation codes to be re-used. The only embodiments (page 4, line 23-page 9, line 18) which do not contain this feature are clearly identified as prior art. It appears that this feature is **essential** (Article 6 PCT) and, as such, it should have been included in independent claim 1.

tree or in the sub-tree below the specific code is used within the same cell. This restriction on channelisation code allocation applies as well to the uplink except that it is for a mobile station and not for a cell. Moreover, the allocation of uplink channelisation code can be easily predefined in such a way as to ensure that the restriction is not violated. As for the downlink, channelisation allocation can be quite complicated since it has to share the channelisation code tree among different mobile stations. A change in spreading factor in the downlink requires performing the RAB modification procedure. This is because the DPCCH and the dedicated physical data channel (DPDCH) are time-multiplexed and thus use the same channelisation code. Decoding the TFCI in the DPCCH requires knowledge of the spreading factor in advance. Hence, a 10 ms symbol rate resolution change is not possible. A symbol rate change of 10 ms is still possible through dynamic rate matching, however the spreading factor is constant (i.e. set to lower spreading factor than is required for the physical channel). The problem is summarised as follows. In the uplink, there is an increase in in interference level due to the use of predefined channelisation code among mobile stations.

In the downlink, there is a complicated code allocation algorithm to optimise the use of the channelisation code tree, a slow spreading factor changes due to time-multiplexing of the DPCCH and DPDCH, and a code shortage problem due to a single code tree among different mobile stations within a cell.

It is therefore an object of the present invention to provide a technique for allocating a code branch in the uplink or in the downlink of a spread spectrum CDMA system which results in an improved system performance.

Summary of the Invention

According to the present invention there is provided a method of allocating a channelisation code comprising: for each user, defining a path in the code tree based on a required range of spreading factors, selecting a node of the path in dependence on the currently required spreading factor; and reserving all nodes on the code tree in an upward and downward direction

from the selected node; wherein the selected node for any user must not coincide with a node reserved by any other user.

If a selected node does coincide with a node reserved by another user, a new path may be defined for the user.

- 5 The selected node for any user may not coincide with a node reserved by any other user only if the user and any other user are operational at the same time.

The method may further comprise the step of defining at least two paths in the code tree for any user.

- 10 The step of defining a path in the code tree may comprise defining an origin node for each user; and defining a path from the origin node based on the required range of spreading factors.

The defined path for each user may be communicated to the user in the downlink during the RAB establishment. The selected node for each user

- 15 may be communicated to the user in the data packets.

The invention will now be described by way of example with reference to the accompanying drawings, in which:

Brief Description of the Drawings

Figure 1 illustrates the basic principle of a code tree;

- 20 Figure 2 is a flow diagram illustrating the general steps of a channelisation code allocation technique according to the prior art;

Figure 3 illustrates a specific example of code allocation according to the technique of Figure 2;

- 25 Figure 4 is a flow diagram illustrating the general steps of a new channelisation code allocation technique;

Figures 5(a) and 5(b) illustrate a specific example of code allocation according to the technique of Figure 4;

Figure 6 illustrates the general steps in communicating a channelisation code for the downlink according to a known technique; and

- 30 Figure 7 illustrates the general steps in communicating a channelisation code for the downlink according to a new technique.

Description of Preferred Embodiment

Claims

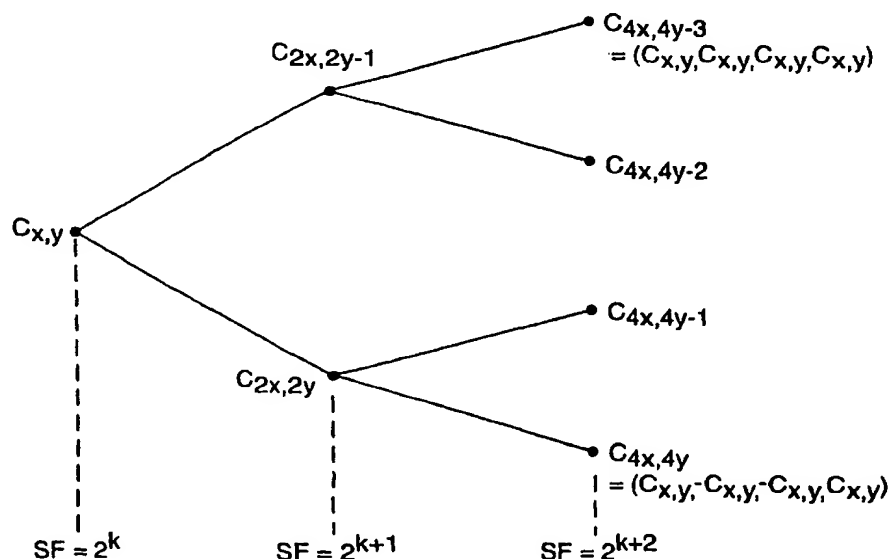
1. A method of allocating a channelisation code comprising: for each user, defining a path in the code tree based on a required range of spreading factors, selecting a node of the path in dependence on the currently
5 required spreading factor; and reserving all nodes on the code tree in an upward and downward direction from the selected node; wherein the selected node for any user must not coincide with a node reserved by any other user.
2. The method of claim 1, wherein if a selected node does coincide with a
10 node reserved by another user, a new path is defined for the user.
3. The method of claim 1 or claim 2, wherein the selected node for any user must not coincide with a node reserved by any other user only if the user and any other user are operational at the same time.
4. The method of any one of claims 1 to 3, further comprising the step of
15 defining at least two paths in the code tree for any user.
5. The method of any preceding claim, wherein the step of defining a path in the code tree comprises defining an origin node for each user; and defining a path from the origin node based on the required range of spreading factors.
- 20 6. The method of any preceding claim wherein the defined path for each user is communicated to the user in the downlink during the RAB establishment
7. The method of claim 5 wherein the selected node for each user is communicated to the user in the data packets.



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : H04J 11/00, H04Q 7/38	A1	(11) International Publication Number: WO 00/54443 (43) International Publication Date: 14 September 2000 (14.09.00)
<p>(21) International Application Number: PCT/GB00/00696</p> <p>(22) International Filing Date: 28 February 2000 (28.02.00)</p> <p>(30) Priority Data: <input checked="" type="checkbox"/> 99301810.0 <input type="checkbox"/> 10 March 1999 (10.03.99) EP</p> <p>(71) Applicant (for all designated States except US): LUCENT TECHNOLOGIES INC. [US/US]; 600 Mountain Avenue, Murray Hill, NJ 07974-0636 (US).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): CAO, Qiang [CN/GB]; 23 Castlefield Close, Swindon, Wiltshire SN5 7EG (GB). LIM, Seau [SG/GB]; 17 Union Street, Swindon, Wiltshire SN1 3LD (GB). MUECKENHEIM, Jens [DE/DE]; Flataustrasse 57, D-90411 Nuremberg (DE).</p> <p>(74) Agents: WILLIAMS, David, J. et al.; Lucent Technologies UK Limited, 5 Mornington Road, Woodford Green, Essex IG8 0TU (GB).</p>	<p>(81) Designated States: AU, BR, CA, CN, ID, IN, JP, KR, US.</p> <p>Published With international search report.</p>	

(54) Title: CODE BRANCH ALLOCATION FOR CDMA SYSTEMS



(57) Abstract

There is disclosed a method of allocating a channelisation code comprising: for each user, defining a path in the code tree based on a required range of spreading factors, selecting a node of the path in dependence on the currently required spreading factor; and reserving all nodes on the code tree in an upward and downward direction from the selected node; wherein the selected node for any user must not coincide with a node reserved by any other user.

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Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

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PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference Q. CAO 14-2-2	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 00/ 00696	International filing date (day/month/year) 28/02/2000	(Earliest) Priority Date (day/month/year) 10/03/1999
Applicant LUCENT TECHNOLOGIES INC. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☒ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1
☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/00696

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04J11/00 H04Q7/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04Q H04B H04J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>✓ W0 95 03652 A (QUALCOMM INC) 2 February 1995 (1995-02-02) page 4, line 1 - line 18 page 13, line 30 -page 17, line 17 page 26, line 25 -page 27, line 2 abstract; claims 1-19; figure 2</p>	1-3, 5, 6
X	<p>✓ EP 0 814 581 A (NIPPON TELEGRAPH & TELEPHONE) 29 December 1997 (1997-12-29) column 4, line 46 - line 54 column 6, line 9 - line 38 abstract; figure 3</p>	1, 2, 5
A		3, 4, 6

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

24 May 2000

Date of mailing of the international search report

02/06/2000

Name and mailing address of the ISA

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Authorized officer

Coppieters, S

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/00696

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>✓ I C -L ET AL: "MULTI-CODE CDMA WIRELESS PERSONAL COMMUNICATIONS NETWORKS" COMMUNICATIONS - GATEWAY TO GLOBALIZATION. PROCEEDINGS OF THE CONFERENCE ON COMMUNICATIONS, SEATTLE, JUNE 18 - 22, 1995, vol. 2, 18 June 1995 (1995-06-18), pages 1060-1064, XP000533158 INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS ISBN: 0-7803-2487-0 page 1060, right-hand column, line 30 -page 1061, left-hand column, line 13 page 1062, right-hand column, line 1 -page 1063, left-hand column, line 15</p> <p>-----</p>	1,5,6

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 00/00696

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9503652	A	02-02-1995	AU 7368294 A	20-02-1995
			IL 110373 A	06-12-1998
			US 5751761 A	12-05-1998
			ZA 9405260 A	27-02-1995

EP 0814581	A	29-12-1997	JP 10290211 A	27-10-1998
			CA 2208085 A	19-12-1997
			CN 1171675 A	28-01-1998
